

Partial translation of JP11-315574 A

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[0013]

[Embodiment of the Invention] Fig. 1 is a left side view showing a principal part of a nozzle device according to the present invention, Fig. 2 is a schematic view showing a washing water supply system, and Fig. 3 is a perspective view of an example in which a sanitary washing apparatus is provided in a toilet bowl body.

[0014] A casing 1 in the sanitary washing apparatus is fixed to a toilet bowl body 50 as shown in Fig. 3, and the casing 1 accommodates a heating tank 1c, a valve unit 1d, and a control unit 1e, as shown in Fig. 2. Further, a nozzle device 3 that advances to its washing position to blow out washing water is incorporated into the casing 1.

[0015] The nozzle device 3 comprises a base 3a fixed in the casing 1, and a nozzle body 4 is incorporated into the base 3a so as to be movable along its axis. The base 3a has a sliding surface in a concavely-curved shape receiving a lower surface of the nozzle body 4 in a pipe shape formed therein, and has a cleaning chamber 3b for cleaning a nozzle head 4a in the nozzle body 4 provided at its front end. Further, a drive motor 5 is provided at a base end of the base 3a, and its output shaft is connected to the nozzle body 4 by mechanical means such as a belt, to operate the nozzle body 4 back and forth between its washing position and accommodation position by reciprocal rotation of the output shaft. When the nozzle body 4 is returned to the

accommodation position, the nozzle head 4a at the front end has such an axis as to be accommodated in the cleaning chamber 3b.

[0016] The nozzle body 4 has two flow paths formed in its inner part, to take one of them for anus washing and take the other for bidet. Two supply pipes 6a and 6b from the valve unit 1d are respectively connected to the flow paths so that washing water can be blown out from a blowout hole provided in the nozzle head 4a when the nozzle head 4a reaches a washing position of either one of the flow paths. In order to follow the movement of the nozzle body 4, used as the supply pipes 6a and 6b are flexible ones.

[0017] Fig. 4 is a diagram showing the details of an operation unit 2, in which a stop switch 2a for stopping the function of washing, drying, or the like, a first switch 2b for anus washing, a second switch 2c for bidet, and a drying switch 2d for operating a hot-air fan (not shown) contained in the casing 1 are arranged. Further, there is provided a set of flow rate setting switches 2e and 2f for increasing or decreasing the flow rate of washing water, and an indicating lamp 2g for indicating the increase or decrease of the flow rates at seven stages from the minimum flow rate is arranged. When the flow rate setting switches 2e and 2f are operated, the aperture of the valve contained in the valve unit 1d is changed so that the flow rate is set. Examples having such a valve mechanism include a needle valve comprising a needle operable back and forth by an electric motor as a valve member and a valve comprising a piezoelectric actuator utilizing a piezoelectric element,

for example, as a driving source of a valve member.

[0018] When the first switch 2b is pressed, the valve in the valve unit 1d is opened. After the valve is closed when a predetermined time period has elapsed, the drive motor 5 is operated, to open the valve in the valve unit 1d so that washing water is blown out when the nozzle head 4a reaches its washing position. When the stop switch 2a is pressed after the use, the valve in the valve unit 1d is closed. Then, an output shaft of the drive motor 5 is then reversed, to return the nozzle body 4 into the casing 1. When the valve in the valve unit 1 is closed again, the blowout of the washing water is also stopped.

[0019] When the second switch 2c is pressed, the nozzle body 4 similarly advances to the washing position. If the stop switch 2a is pressed after the use, the nozzle body 4 can be returned to the accommodation position. The blowout of washing water is the same as that in the case of the first switch 2b.

[0020] A sitting sensor 1f for a toilet seat 1a is provided as shown in Fig. 2 so as to prevent the blowout of the washing water from the nozzle body 4 unless somebody is sitting on the toilet seat 1a. For this sitting sensor 1f, a pressure-sensitive sensor provided on the rear face of the toilet seat 1a or a photoelectric sensor utilizing infrared rays is utilized. A signal of the sitting sensor 1f is input to the control unit 1e, so that the control unit controls the washing water such that it is blown out from the nozzle body 4 only when the sitting sensor 1f is turned on. In other words, if nobody is sitting on the toilet seat

1a, the valve of the valve unit 1d is kept unopened and the drive motor 5 is kept inoperative even though the first washing switch 2b or the second washing switch 2c is pressed.

[0021] Fig. 5 is a flow chart of the former half of a control system in a case where the nozzle body 4 and the nozzle head 4a are cleaned, Fig. 6 is a flow chart of the latter half of the control system, and Fig. 7 is a timing chart.

[0022] As can be seen from the drawings, in a case where nobody is sitting on the toilet seat 1a so that there is no sitting sensing signal from the sitting sensor 1f, when the stop switch 2a continues to be pressed for not less than three seconds, as shown in Fig. 7 (a), the drive motor 5 is operated, to advance the nozzle body 4 to the washing position shown in Fig. 1. At this time, washing water is not blown out from the time when the nozzle body 4 starts to move to the time when it is stopped with the valve in the valve unit 1d closed. Even if a person releases his or her finger from the stop switch 2a, the nozzle body 4 is stopped as it is, as shown in Fig. 1. Consequently, the nozzle body 4 and the nozzle head 4a enter a state where they exit from the casing 1. Moreover, no washing water is blown out from the nozzle head 4a. Therefore, a person who does cleaning can sufficiently wipe the nozzle body 4 and the nozzle head 4a with both his or her hands.

[0023] When the stop switch 2a is pressed again upon termination of the cleaning, the output shaft of the drive motor 5 is reversed so that the nozzle body 4 is

accommodated within the casing 1. During the accommodating operation, the valve in the valve unit 1d also remains closed so that no washing water is blown out. When the nozzle body 4 is accommodated in the casing 1, the drive motor 5 is stopped. From the accommodation on, if the first switch 2b and the second switch 2c, for example, are pressed, the nozzle body 4 advances and washing water is supplied from the valve unit 1d as usual.

[0024] Furthermore, when the stop switch 2a continues to be pressed for not less than 10 seconds, as shown in Fig. 7 (b), during the cleaning, the control unit 1e operates the drive motor 5 such that the output shaft is reversed, to accommodate the nozzle body 4 in the casing 1. A cleaning mode is thus canceled, so that the nozzle body 4 does not remain exiting even if a short fault or the like occurs in the operation unit 2.

[0025] The operation of the drive motor 5 and the maintenance of a valve closed state of the valve unit 1d are possible only when the sitting sensor 1f is off, that is, only when nobody is sitting on the toilet seat 1a. The operation of the stop switch 2a in accommodating the nozzle body 4 causes control to be switched to a normal washing mode simultaneously with the retreat of the nozzle body 4. Consequently, a special switch for switching from the cleaning mode to the normal washing mode is not required, so that the operation also becomes simple.

[0026] Furthermore, when the sitting sensor 1f is on, the drive motor 5 is not operated even if the stop switch 2a is pressed. Even if the stop switch 2a continues to be

erroneously pressed for not less than three seconds when a person is sitting on the toilet seat 1a to relieve nature, therefore, the nozzle body 4 remains stopped in the casing 1. Consequently, the nozzle body 4 and the nozzle head 4a can first advance to the washing position to do washing by the operation of the first or second switch 2b or 2c without being exposed to filth or the like.

[Brief Description of the Drawings]

[Fig. 1] A left side view showing a principal part of a nozzle device in a sanitary washing apparatus.

[Fig. 2] A schematic view of a driving system in a nozzle device for supplying washing water.

[Fig. 3] A perspective view showing an example in which a casing in a sanitary washing apparatus is provided in a toilet bowl body.

[Fig. 4] A plan view of an operation unit.

[Fig. 5] A flow chart of the former half of processing showing the operation of each equipment by the operation of a stop switch.

[Fig. 6] A flow chart of the latter half of the processing.

[Fig. 7] A timing chart of the operations of a sitting sensor, a stop switch, a drive motor, and a valve unit in a case where a nozzle body is cleaned and a case where it is accommodated in a casing.

[Fig. 8] A perspective view of a conventional example in which a sanitary washing apparatus is installed on a toilet bowl.

[Description of Reference Numerals]

1 casing

1a toilet seat
1c heating tank
1d valve unit
1e control unit
1f sitting sensor
2 operation unit
2a stop switch
2b first switch
2c second switch
3 nozzle device
4 nozzle body
4a nozzle head
5 drive motor

FIG. 5

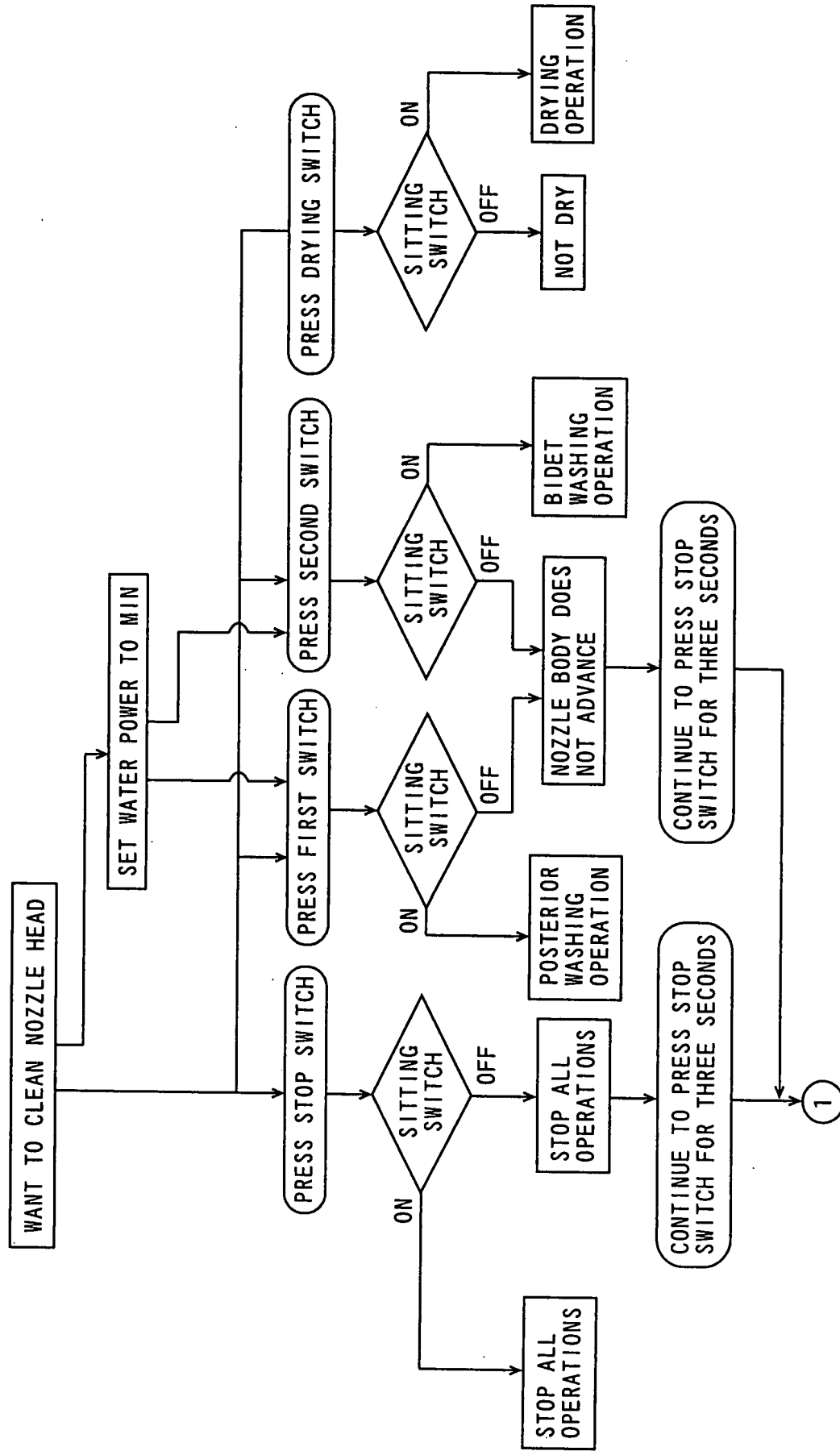


FIG. 6

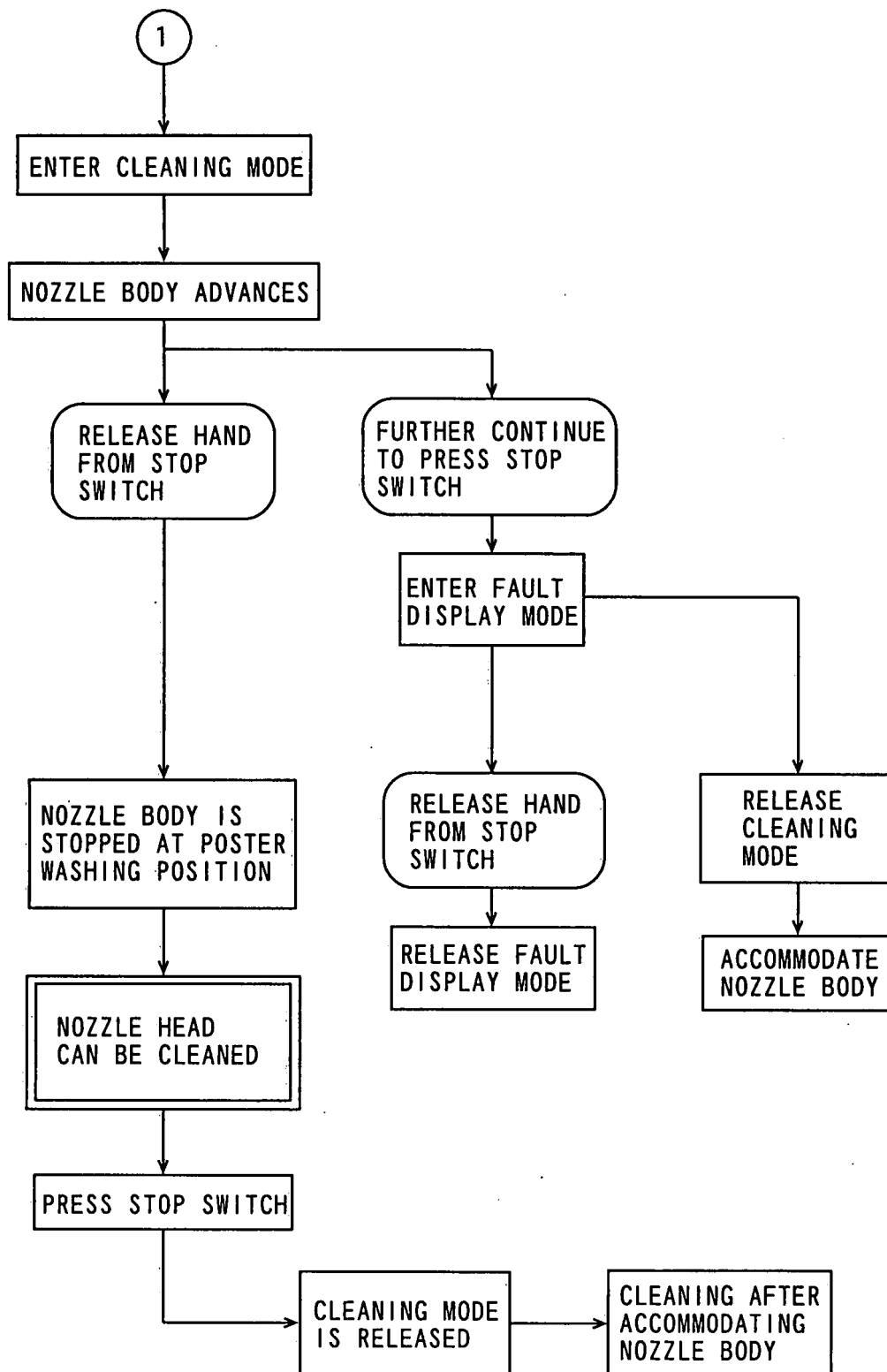
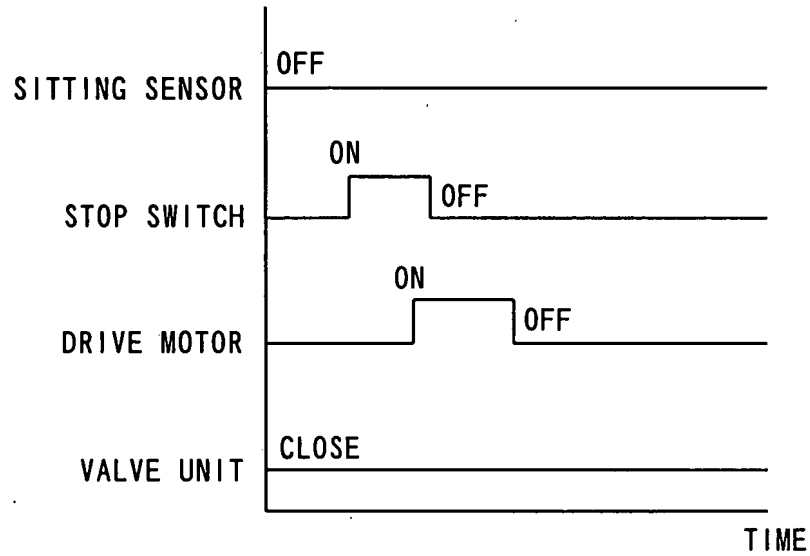


FIG. 7

(a)



(b)

